THE 1-3⅓-10-13-33 CONJECTURE

A hypothesis on the global convergence of fertility, its generational price, and the 1,000 years to extinction.

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1 - 3⅓ - 10 - 13 - 33: one child per woman as the conjectured level; 3⅓ generations to 1 billion; 10 to 10 million; 13 to 1 million; 33 to the mathematical limit of the model, in approximately 1,000 years to mathematical extinction.

This is a conjecture, not a prediction. The 1 is the conjectured fertility level; 3⅓, 10, 13 and 33 are symbolic generational milestones of its mathematical price. In the exact continuous calculation, they correspond approximately to 3.33, 10, 13.30 and 33.22 generations.

Abstract

This note formalizes the 1-3⅓-10-13-33 Conjecture: the hypothesis that global fertility, after crossing replacement level, will continue to decline for less than one generation until stabilizing at approximately one child per woman. The conjecture does not claim that this value is a natural law, nor that all societies will reach it simultaneously. Rather, it proposes that contemporary modernization may be generating a global demographic attractor strong enough for civilizational and institutional differences eventually to produce variation around a common level far below replacement. If $F \approx 1$ and the generational approximation $g \approx F/2$ is used, each generation is approximately half the size of the preceding one. Starting from an illustrative population of 10 billion, the simple model reaches 1 billion in 3.32 generations - approximately 3⅓ - 10 million in 10 generations, 1 million in 13.30 generations - approximately 13 - and the mathematical threshold below one person in 33.22 generations - approximately 33 - about 1,000 years from now. These four milestones make visible, at successive scales, the arithmetic price of sustained unit fertility: a demographic half-life of one generation.

Keywords: fertility; replacement; 1-3⅓-10-13-33 Conjecture; demographic attractor; modernity; exponential decline; demographic half-life; demographic sustainability; extinction; generations; multicivilizational suicide.

1. The 1-3⅓-10-13-33 Conjecture

The 1-3⅓-10-13-33 Conjecture. If current fertility decline trends persist, the global fertility rate will not simply stop around replacement level. My central hypothesis is that, in less than one generation, it will converge toward an order of magnitude close to F = 1.0 child per woman and that this level may become relatively persistent at the global scale. Once that level is fixed, the simplified model produces an especially expressive sequence: approximately 3⅓ generations to 1 billion, 10 to 10 million, 13 to 1 million and 33 to the mathematical threshold below one person, starting from an illustrative base of 10 billion.

The conjecture has three distinct components:

- Temporal: convergence would occur in less than one generation, that is, within an approximate horizon of less than 25-30 years.
- Level: the convergence point would not be 2.1 or 1.7, but approximately 1.0 child per woman, with significant variation across societies.
- Structural: the ultimate cause would not be a single temporary shock, but a set of forces of modernity that tend to reproduce themselves in economically and culturally very different societies.

> The arithmetic price of F = 1 is simple: each generation reproduces approximately only half the base of the preceding one. 3⅓, 10, 13 and 33 are four symbolic milestones of this compounding.

2. Minimal formalization

Let $t = 0, 1, 2, \ldots$ denote generations; P_0 the initial population; F the total fertility rate of the scenario; and g the simplified generational multiplier.

$$g \approx F / 2$$

$$P(t) = P_0 \cdot g^t$$

$$\text{If } F = 1.0 \Rightarrow g \approx 0.5 \Rightarrow P(t) = P_0 \cdot (1/2)^t$$

The demographic half-life is:

$$t_{½} = \ln(0.5) / \ln(g) = 1 \text{ generation}$$

Therefore, under the central scenario, the most important property is extraordinarily intuitive: each successive generation is approximately half the size of the preceding one. This is not a linear reduction, but an exponential sequence: 100%, 50%, 25%, 12.5%, 6.25%, 3.125%...

3. The price of the scenario: 1, 3⅓, 10, 13, 33 and 1,000 years to extinction

Using a purely illustrative starting point of P_0 = 10 billion inhabitants and an average generation length L = 30 years, the main thresholds of the model are as follows. Four generational milestones work especially well as a summary: 3⅓ generations to fall to approximately one tenth of the initial population - 1 billion; 10 generations to reach the order of 10 million; 13 generations to reach the order of 1 million; and 33 generations to reach the mathematical threshold below one person. The exact values in the continuous calculation are 3.32, 9.97, 13.29 and 33.22, but 3⅓, 10, 13 and 33 function as symbolic and memorable figures.

Population threshold	Generations	Years (L=30)	Interpretation
5 billion	1.00	30	One half-life
1 billion	3.33 (≈ 3⅓)	100	≈ 3⅓ generations: 1 billion, one tenth of the initial base
100 million	6.66	200	One hundredth
10 million	10	300	≈ 10 generations: 10 million, one thousandth
1 million	13.30 (≈ 13)	399	≈ 13 generations: 1 million, demographic residue
< 4	31.22	937	Symbolic near-extinction threshold
< 1	33.22 (≈ 33)	997 (≈ 1,000)	≈ 33 generations: mathematical limit of the model

Note: the thresholds “1 million”, “< 4” and “< 1” are not biological estimates of viability. They are illustrative, symbolic and mathematical thresholds. The functional disappearance of a population would occur well before the formal limit.

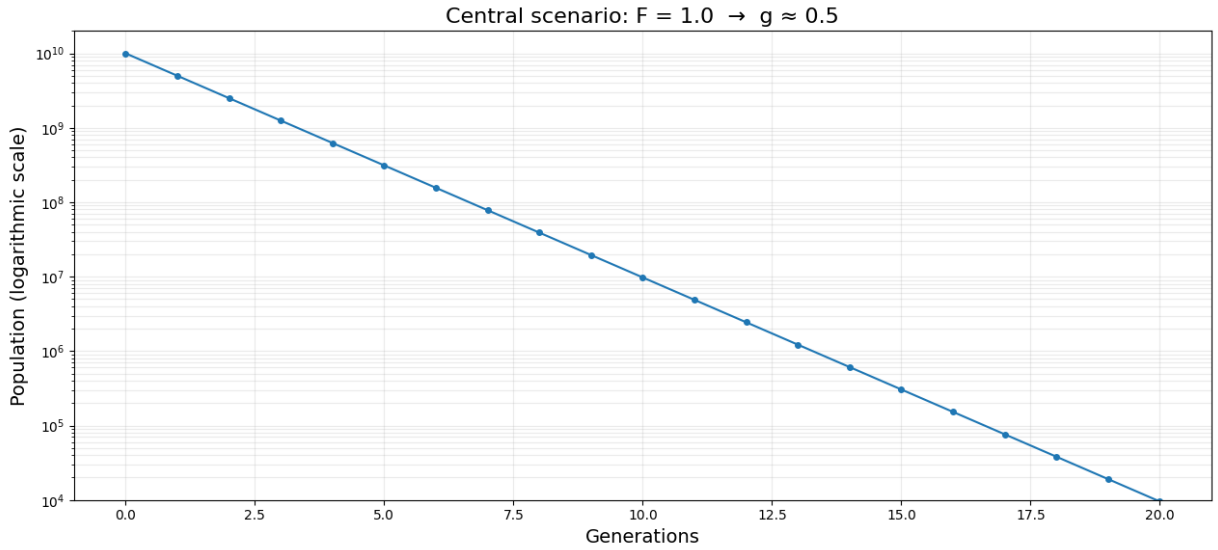

Figure 1. Simplified trajectory of an initial population of 10 billion with F = 1.0 and g ≈ 0.5. The vertical axis is logarithmic.

4. Why 1? And why 3⅓, 10, 13 and 33?

The riskiest part of the conjecture is the level 1, not the mathematical consequences that follow from it. That sustained fertility below replacement produces contraction is arithmetic. That the world will converge approximately toward 1 is an empirical hypothesis about the future. Assuming F ≈ 1, the 3⅓-10-13-33 sequence is conditional on the model: approximately 3⅓ generations to 1 billion, 10 to 10 million, 13 to 1 million and 33 to the mathematical threshold below one person, starting from 10 billion.

The conjecture rests on four intuitions:

- The decline is no longer exclusive to rich Western societies: it appears in East Asian, Latin American, Middle Eastern and other societies with very different institutions, religions and histories.
- Late transitions appear capable of being faster than the first ones: societies starting from high fertility can traverse in decades trajectories that previously required much more time.
- Replacement level is not an automatic economic attractor. There is no mechanism equivalent to a market price that spontaneously forces fertility back to 2.1.
- Once the third child becomes exceptional, small changes in the share of people with no children or only one child can quickly shift aggregate fertility toward 1.3, 1.1 or 1.0.

5. What would confirmation mean?

If global fertility converged toward 1, the demographic problem would change qualitatively. We would no longer be talking only about aging, pensions or a moderate population decline. We would be talking about a regime in which the reproductive base shrinks by approximately 50% in each generation.

This would have at least four conceptual consequences:

- Demographic sustainability would become a constraint as fundamental as material or ecological sustainability.
- Immigration could no longer be interpreted as a global solution: it redistributes population among territories, but it does not create generations at the planetary scale.
- Civilizational diversity would provide resilience only if it also preserved reproductive diversity. If different civilizations converge on the same below-replacement regime, that redundancy disappears.

- “Multicivilizational suicide” would become a possible philosophical description of an uncoordinated process: independent societies, by different paths, arriving at the same self-destructive demographic equilibrium.

The 1 is the conjecture. The 3⅓, 10, 13 and 33 are four milestones of its mathematical price.

6. Falsifiability and conditions for rejection

The 1-3⅓-10-13-33 Conjecture must be capable of being false. It is not a doctrine but an explanatory and quantitative wager. The milestones 3⅓, 10, 13 and 33 retain their meaning only if the first term of the conjecture - persistent fertility close to 1 - comes close to reality. It should be considered weakened or rejected if, over the next two or three decades, any of the following patterns occurs:

- global fertility stabilizes durably and clearly above 1.5-1.7;
- a broad number of advanced societies return sustainably to replacement without depending on a profound transformation of their social model;
- regional convergence stops and persistently very different reproductive equilibria become consolidated;
- a robust endogenous mechanism emerges that systematically raises fertility when a society falls far below replacement.

Conversely, the conjecture would gain strength if fertility continued to fall in middle-income countries, if high-fertility exceptions diminished or became concentrated in specific subpopulations, and if rebounds observed after very low minima proved modest and insufficient to return to replacement.

7. Closing: 1, 3⅓, 10, 13, 33

My central hypothesis is not that humanity will become extinct on a specific date. It is simpler and, precisely for that reason, more demanding: global fertility may converge, in less than one generation, toward approximately one child per woman, and there is currently no known mechanism that guarantees a spontaneous return to replacement.

If that happens, five numbers summarize the scenario:

1 → conjectured fertility; 3⅓ → approximately 3.33 generations to 1 billion; 10 → to 10 million; 13 → approximately 13.30 generations to 1 million; 33 → approximately 33.22 generations to the mathematical threshold below one person, in about 1,000 years to mathematical extinction.

The 1 is the empirical conjecture. The 3⅓, 10, 13 and 33 are its mathematical price, expressed as a sequence of milestones. The 3⅓ shows that in little more than three generations the population would be reduced to one tenth; the 10, that in ten generations it would enter the order of only ten million; the 13, that it would reach the order of one million; and the 33, that it makes visible the mathematical limit of the exponential. From that point onward, the question ceases to be how many billions exist today and becomes the reproductive relationship between one generation and the next. An immense stock can conceal an insufficient flow. The 1-3⅓-10-13-33 Conjecture is, in this sense, a conjecture about the multiplier that could govern the twenty-first century, through the end of the third millennium.

Methodological notes

- The model $g \approx F/2$ is deliberately pedagogical. In empirical demography, effective replacement also depends on survival, age structure, sex ratio, fertility timing and the net reproduction rate.
- “Less than one generation” is used here as an approximate horizon of less than 25-30 years, not as an exact date.
- The initial population of 10 billion is a round base used to visualize the mechanism. It is not a statement about the current world population.
- Convergence toward $F \approx 1$ is the conjectural element. The approximate milestones 3⅓, 10, 13 and 33 are conditional mathematical consequences of the model for an initial base of 10 billion; the corresponding continuous values are 3.32, 9.97, 13.29 and 33.22. They are not literal demographic predictions.
- “Multicivilizational suicide” is a philosophical and rhetorical category, not a technical demographic category.

References

Gatnau, X. (2024-2026). Generations to Extinction: a manifesto on replacement, compounding and the quiet violence of exponential decline.